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Indian Standard

SPECIFICATION FOR BREAKING CORD FOR COTTON PARACHUTES

(First Revision)

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NEW DELHI 110002

Gr 2 *July* 1988

Indian Standard

SPECIFICATION FOR BREAKING CORD FOR COTTON PARACHUTES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 31 December 1987, after the draft finalized by the Textile Materials for Aerospace Purposes Sectional Committee had been approved by the Textile Divison Council.

0.2 This Indian Standard was originally published in 1964 based on IND/AIR/TC/0277 'Thread, breaking, for cotton parachutes' issued by the Ministry of Defence, Government of India. The present revision has been undertaken to incorporate the following changes:

a) The scope has been modified to indicate the specific use of the cord.

b) The breaking cord in braided construction has also been permitted.

c) The requirements for water soluble matter, scouring loss, rot-proofing and *p*H value of the aqueous extract of the cord have been added.

d) The condition in which the cord can be supplied has been included.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

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1. SCOPE

1.1 This standard prescribes constructional details and other requirements of breaking cord for cotton parachutes used in equipment/cargo aerial delivery.

2. MANUFACTURE

2.1 Yarn — The yarn, used in the manufacture of the cord, shall be single yarn made of cotton conforming to IS : 171-1985*. The yarn shall be evenly spun and well twisted. The turns per metre in the yarn shall be so adjusted as to produce a balanced twist cord. The yarn shall be, as far as possible, free from knots. One knot in every 200 m shall, however, be permissible.

2.2 Cord — The cord shall be manufactured from well twisted strands of single yarns as indicated in **2.1** and the cord shall consist of doubling twist inserted uniformly throughout its length. The cord shall be either twisted or braided.

3. FINISH

3.1 Condition of Material — The breaking cord shall be supplied in one of the following conditions:

a) Scoured and rot-proofed; or

b) Scoured, dyed and rot-proofed.

3.2 Dyeing — In the case of dyed cord, the colour shall be as stated in the contract or order. The dyeing may be done either at the yarn stage or at the cord stage. Sulphur dyes shall not be used.

3.3 Rot-proofing — The cord or yarns (scoured or scoured and dyed) to be rot-proofed shall be evenly and thoroughly impregnated with a solvent solution or aqueous emulsion of lauryl pentachlorophenol (LPCP) or of pentachlorophenyl laurate (PCPL). This shall be followed by removal of the excess treatment and subsequent drying. The treated material shall be dry and non-tacky. The LPCP or PCPL content of the treated material, when tested according to the methods prescribed in IS : 3522 (Part 2)-1970* or IS : 11662-1986†, shall not be less than 1·7 percent and not more than 2·5 percent on the oven-dry mass of the material.

4. REQUIREMENTS

4.1 The cord shall meet the physical and chemical requirements given in Tables 1 and 2, and the requirements for balance of twist as given in **4.2**.

NOTE — The breaking cord in braided construction is also permissible provided it complies with the requirements of mass and breaking load given in Table 1 and chemical requirements given in Table 2.

4.2 Balance of Twist — When approximately 1·5 m of breaking cord is extended between the hands

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*Specification for cotton and cotton regenerated cellulosic fibre blended grey yarn (*third revision*).

*Methods for estimation of common preservatives used in textile industry, Part 2.

†Specification for preservative treatments of textiles.

TABLE 1 PHYSICAL REQUIREMENTS

(*Clause* 4.1)

UNIVERSAL COUNT (COTTON COUNT) OF SINGLE YARN USED IN THE CORD (1)	CONSTRUCTION (2)	DIRECTION OF TWIST (3)	MASS IN kg PER 1 000 m (4)	BREAKING LOAD OF CORD, IN kg ON 50 cm TEST LENGTH (5)
30 tex (or 20^s)	Three strands each of 15 plies	Z/Z/S	1·8	20·5
Tolerance ± 5 percent	—	—	± 5 percent	± 2·5
Methods of Test IS : 1315-1977*	—	—	Annexure A	IS : 1670-1970†

*Method for determination of linear density of yarns spun on cotton system (*first revision*).

†Method for determination of breaking load, elongation at break and tenacity of yanrs (*first revision*).

TABLE 2 CHEMICAL REQUIREMENTS

(*Clause* 4.1)

SL No. (1)	CHARACTERISTIC (2)	REQUIREMENT (3)	METHOD OF TEST (4)
i)	Colour fastness (for dyed cord only)		
	a) Light	5 or better	IS : 2454-1985*
	b) Washing : Test 3 (Change in colour only)	5 or better	IS : 764-1979†
ii)	Scouring loss, percent, *Max*	2·0	IS : 1383-1977‡ (Mild method)
iii)	Water soluble matter, percent, *Max*	1·0	IS : 3456-1966§
iv)	*p*H value of aqueous extract	6·0-8·5	IS : 1390-1983 ‖ (Hot method)

*Methods for determination of colour fastness of textile materials to artificial light (xonon lamp) (*first revision*).

†Method for determination of colour fastness of textile materials to washing: Test 3 (*second revision*).

‡Methods for determination of scouring loss in grey and finished cotton textile materials (*first revision*).

§Method for determination of water soluble matter of textile materials.

‖Methods for determination of *p*H value of aqueous extracts of textile materials (*first revision*).

and the ends brought slowly together, the loop so formed shall not kink, double or re-twist. A maximum of five turns in the loop shall be permissible.

5. SEALED SAMPLE

5.1 If, in order to illustrate or specify the general appearance, feel, shade, etc, of breaking cord, a sample has been agreed upon and sealed, the supply shall be in conformity with the sealed sample in such respects.

5.1.1 The custody of the sealed sample shall be a matter of prior agreement between the buyer and the seller.

6. PACKAGING

6.1 The breaking cord shall be packed into balls, tubes, cops or reels as required.

6.1.1 Each ball, tube, cop or reel shall contain 50 m of breaking cord.

7. MARKING

7.1 Each ball, tube, cop or reel containing breaking cord shall be marked with the following information:

a) Manufacturer's name, initials or trade-mark;
b) Length, in metres; and
c) Month and year of manufacture.

7.1.1 Each ball, tube, cop or reel may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standard Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

8. PACKING

8.1 The breaking cord shall be packed in accordance with either IS : 1347-1972* or IS : 293-1980† as the case may be.

9. SAMPLING

9.1 Lot — The quantity of breaking cord of one definite quality delivered to one buyer against one despatch note shall constitute a lot.

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*Specification for inland packaging of cotton cloth and yarn (*first revision*).

†Code for seaworthy packaging of cotton yarn and cloth (*third revision*).

9.2 For determining the conformity of the lot to the requirement of breaking load, all the balls, cops, tubes or reels in the lot shall be subjected to testing.

9.3 The conformity of the lot to the requirements other than breaking load of this standard shall be determined on the basis of tests carried out on the samples selected from the lot.

9.3.1 Unless otherwise agreed between the buyer and the seller, the number of balls, tubes, cops or reels to be selected at random from the lot shall be in accordance with col 2 of Table 3.

9.3.2 For evaluating knots, balance of twist, construction and direction of twist, the sample selected as in col 2 of Table 3 shall constitute the test sample.

9.3.3 For evaluating count of single yarn, mass in kg per 1 000 m colour fastness, scouring loss, water soluble matter and *p*H value, the sample selected as in col 4 of Table 3 shall constitute the test sample. These may be drawn from the balls, tubes, cops or reels selected for the purpose of **9.3.2**.

9.4 Criteria for Conformity

9.4.1 Those balls, tubes cops or reels which conform to the requirement of breaking load shall be accepted provided the lot satisfies the criteria for conformity of other requirements as given in **9.4.2**.

9.4.2 The lot shall be considered to be in conformity with the requirements other than breaking load of this standard, if the following conditions are satisfied:

a) The number of balls, tubes, cops or reels found defective in respect of any one or more of the characteristics mentioned in **9.3.2** does not exceed the corresponding number given in col 3 of Table 3.

b) From the observed values of the count of single yarn and mass in kg per 1 000 m, the average $\bar{X}$ and the range R are calculated, and the values of the expression $\bar{X} + 0{\cdot}6\,R$ and $\bar{X} - 0{\cdot}6\,R$ lie within the specified limits.

c) The test results for colour fastness, scouring loss, water soluble matter and *p*H value on the samples tested (*see* **9.3.3**) satisfy the specified requirements.

TABLE 3 SAMPLE SIZE AND CRITERIA FOR CONFORMITY
(*Clauses* 9.3.1 *and* 9.3.2)

LOT SIZE (NUMBER OF BALLS, TUBES, COPS OR REELS) (1)	SAMPLE SIZE (2)	PERMISSIBLE NUMBER OF DEFECTIVES (3)	SUB-SAMPLE SIZE (4)
Up to 100	5	0	3
101 to 150	8	0	4
151 to 300	13	1	5
301 to 500	20	1	6
501 to 1 000	32	2	7
1 001 and above	50	3	8

ANNEXURE A

(*Table* 1)

METHOD FOR DETERMINATION OF WEIGHT IN KILOGRAM PER 1 000 m OF BREAKING CORD

A-1. TEST SPECIMENS

A-1.1 For the purpose of this test, all tubes, reels, etc, in the sample under test (*see* **9.3.3**) shall constitute the test specimen.

A-2. ATMOSPHERIC CONDITIONS FOR TESTING

A-2.1 The test shall be carried out in a standard atmosphere at 65 ± 2 percent relative humidity and 27 ± 2°C temperature (*see also* IS : 196-1966*).

A-3. CONDITIONING OF TEST SPECIMENS

A-3.1 Prior to test, the test specimens shall be conditioned in a standard atmosphere at 65 ± 2 percent relative humidity and 27 ± 2°C temperature for 24 hours.

A-4. APPARATUS

A-4.1 Wrap Reel — Equipped with a dial showing the number of revolutions and to wind precisely one metre per revolution.

A-4.2 Analytical Balance

A-5. PROCEDURE

A-5.1 Place a tube, a cop, a ball or a reel constituting the test specimen on the wrap reel and wind 100 m of breaking cord. Apply sufficient tensions on the cord during winding so as to keep it tight without stretching it. Remove the cord so wound, from the wrap reel and weigh it in grams. Calculate the weight in kg per 1 000 m by the following formula:

$$\text{Weight in kg per 1 000 m} = W \times 10$$

where

W = weight in grams.

A-5.2 Repeat the test with the remaining tubes, cops, balls or reels in the test specimen.

A-6. REPORT

A-6.1 Report the lot to be in conformity with the requirements of Table 1 if the test values satisfy the conditions prescribed in **9.4.2(b)**.

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*Atmospheric conditions for testing (*revised*).

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